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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/665,885 | 09/19/2003 | Gunar Lorenz | CVZ-021 | 6781 |

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| EXAMINER | |
|---|---|
| ROSSOSHEK, YELENA | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2825 | |

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/665,885 | LORENZ ET AL. | |
| | Examiner | Art Unit | |
| | Helen Rossoshek | 2825 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *19 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 September 2003* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. This office action is in response to the Application 10/665,885 filed 09/19/2003.

2. Claims 1-59 are pending in the Application.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-59 are rejected under 35 U.S.C. 102(b) as being anticipated by Bächtold et al. ("An error indicator and automatic adaptive meshing for electrostatic boundary element simulations", Dec. 1997, Transactions on Volume 16, Issue 12, Pages: 1439 – 1446).

With respect to claims 1, 13, 24, 28, 41, 42 and 53 Bächtold et al. teaches In a Computer Aided Design (CAD) Environment, a method for automatic mesh generation, a medium holding computer-executable steps for a method, a system within the method for constructing automatically an optimal mesh (page 1446, second paragraph) using modeling and analysis of the MEMS based on the CAD environment (page 1439, abstract) comprising the steps of: composing a schematic MEMS (Micro Electro-Mechanical Systems) design suitable for system-level simulations, the MEMS design including a plurality of components, each the component of the plurality of components being associated with a mesh generator, each the mesh generator being computer

instructions describing how to create a mesh for the associated component as shown on the Fig. 11 depicting the micro electro-mechanical systems MEMS having designed original geometry containing a plurality of elements (524 panels), wherein the initial mesh was generated for each area automatically within CAD environment using modeling program (page 1445, right column, paragraph 4; page 1446,left column, paragraphs 1, 2); providing a mesh generation tool, the mesh generation tool using the plurality of mesh generators to generate at least one mesh that represents at least one of a MEMS device that is the subject of the schematic MEMS design and a user-defined sub-assembly using CAD model for generating an optimal mesh automatically based on the presented scheme of MEMS (abstract), wherein the original geometry (schematic MEMS design) was designed in an interactive (user-defined) solid modeling program (page 1445, right column, paragraph 4); and using the mesh automatically generated from the schematic MEMS design (abstract) as input for a numerical PDE (Partial Differential Equation) solver in a simulation environment within the boundary element method (BEM) applying to the solution of electrostatic simulations by applying partial integration to Laplace's equation (PDE) and finding an equivalent boundary integral formulation (page 1439, left column, paragraph 3; right column, paragraph 2), the PDE solver verifying approximations made in the system-level simulations of the MEMS design within computing the approximate solution using BEM mesh and finding mismatch (verifying approximations) between two potential values to estimate the error (page 1439, right column, paragraph 4), wherein BEM mesh was used for verifying the approximate solution.

With respect to claims 2-12, 14-23, 25-27, 29-40, 43-52 and 54-59 Bächtold et al. teaches:

Claims 2, 14, 29, 43, 55: each the component is one of a behavioral model and at least one connection to other components within discretizing the domain boundary into separate elements, each containing a number of collocation nodes, which are behavioral models since the nodal values represent element shape function (behavior) (page 1439, right column, paragraph 2);

Claims 3, 15, 30, 44, 56: wherein the system-level simulation environment is one of a circuit simulation environment and a signal flow simulation environment within typical simulations involving complex geometries with various dielectric materials, conductors (abstract);

Claims 4, 16, 25, 31, 45, 57, 58, 59: wherein the step of generating at least one mesh includes the further steps of: generating a plurality of individual meshes for the plurality of components in the schematic MEMS design within generating BEM meshes including discretizing the domain boundary into separate elements, each containing a number of collocation nodes, which are behavioral models since the nodal values represent element shape function (behavior) (page 1439, right column, paragraph 2); analyzing the schematic MEMS design to determine connections between a plurality of components in the schematic MEMS design as shown on the Fig. 2 depicting the placement of the evaluation positions for computing the boundary element error indicator as a complex of features metals, a range of dielectrics, etc. (page 1444, right column, paragraph 2); and connecting the plurality of individual meshes into a single

mesh based on the determined connections as shown on the Fig. 8 depicting the generated mesh as plurality of connected individual meshes;

Claims 5, 17, 26, 32, 46: adjusting programmatically a mesh density of each of the individual meshes based upon a programmatic analysis of the schematic MEMS design within automatic adaptive refinement iterations, which improves the solution accuracy (page 1445; right column, paragraph 3; left column, paragraph 2);

Claims 6, 18, 33, 47: adjusting a mesh density of each of the individual meshes based upon an analysis of the schematic MEMS design as sown on the Fig. 6, which is analysis of the element error indicator on the validation geometry (schematic MEMS design) (page 1445; left column, paragraph 2);

Claims 7, 19, 27, 34, 48: selecting an element type for an individual mesh based upon a programmatic analysis of the schematic MEMS design as shown on the Fig. 9 )page 1445; right column, paragraph 2);

Claims 8, 20, 35, 49: selecting an element type for an individual mesh based upon an analysis of the schematic MEMS design as shown on the Fig. 2 (page 1444, right column, paragraph 2);

Claims 9, 22, 36, 51: wherein the PDE solver also receives at least one of boundary conditions and initial conditions as constraints based on programmatic analysis of the schematic design as shown on the Fig. 11 (page 1445; right column, paragraph 4);

Claims 10, 21, 37, 50: providing a component library in the CAD environment, the component library holding a behavioral model for each component of the schematic

MEMS design, the behavioral model being a mathematical description of the component within table 1 for storing mathematical representation of the separate elements after discretizing the domain boundary (Table 1; page 1439, right column, paragraph 2);

Claims 11, 38: wherein the PDE solver is used to obtain 3D simulation results for at least one of mechanical, electrostatic, magnetic, thermal, electrothermal, piezoelectric, piezo-resistive, fluid damping and electromagnetic effects (page 1444; right column, paragraph 3; abstract);

Claims 12, 23, 40, 52, 54: wherein the generated mesh is at least one of a finite element method (FEM) mesh, boundary element method (BEM) mesh and hybrid FEM/BEM mesh (abstract);

Claim 39: using said schematic MEMS design as the basis for a 3D model displayed to a user of said CAD environment (page 1444; left column. Paragraph 2; abstract).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen Rossoshek whose telephone number is 571-272-1905. The examiner can normally be reached on 7:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner
Helen Rossoshek
AU 2825

A. M. Thompson
Primary Examiner
Technology Center 2800